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(58) Field of Search

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(54) Abstract Title

**Controlling sound and/or lighting systems for public functions**

(57) The invention provides an installation for controlling aids such as speakers (8,9,10) and spotlight (12) for public functions in a venue having a stage (4) and an auditorium (6). At least one mobile object such as an actor carrying a microphone is connected to a control unit (20) which controls the speakers and spotlight. A locating system determines the position of the actor on stage, and outputs a position signal indicating the relevant position to the control unit. The control unit controls the speakers and spotlight in dependence on the position signal. The locating system may comprise a plurality of fixed radio beacons (26,26',28,28') and a radio receiver/transmitter incorporated in the microphone.

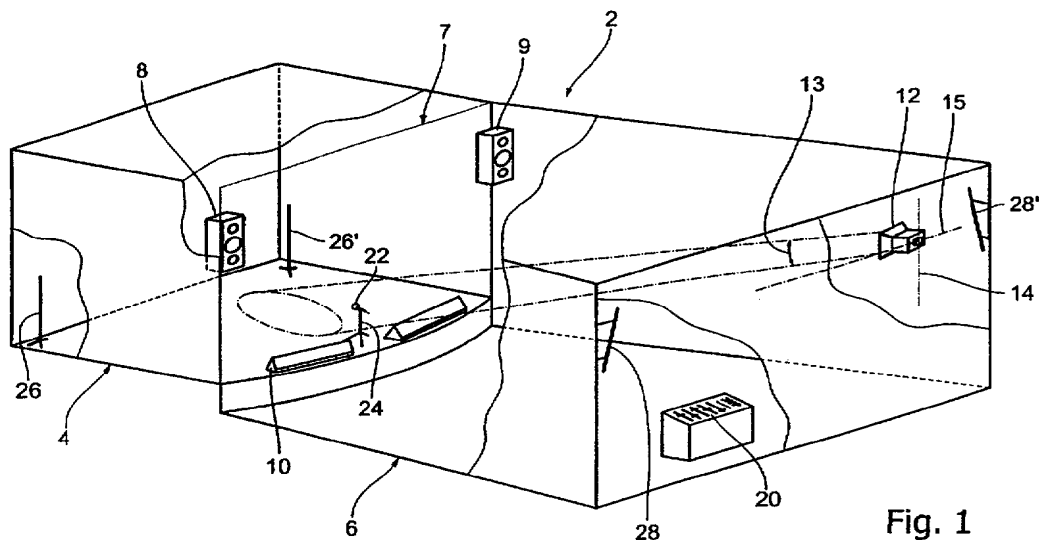


Fig. 1

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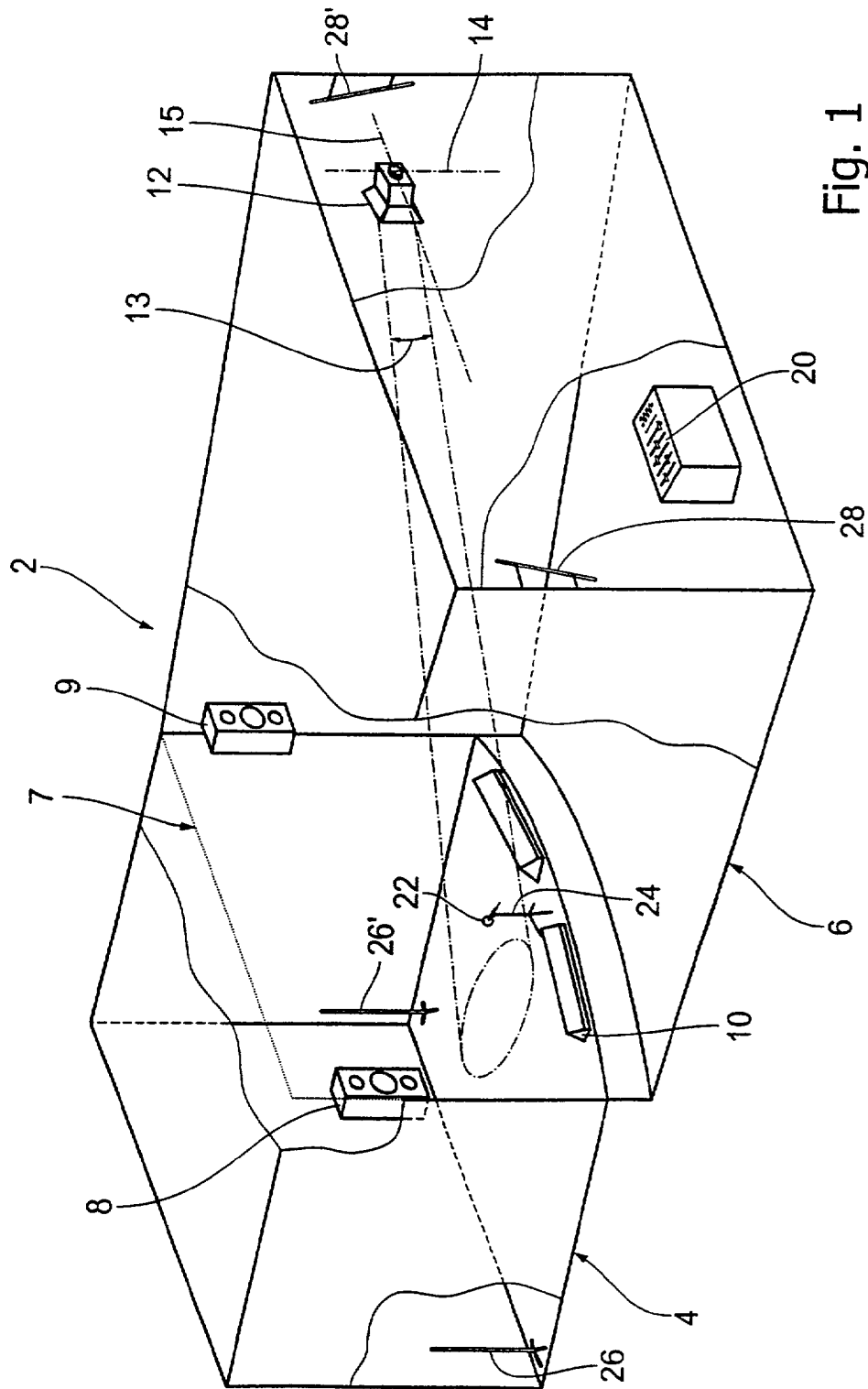


Fig. 1

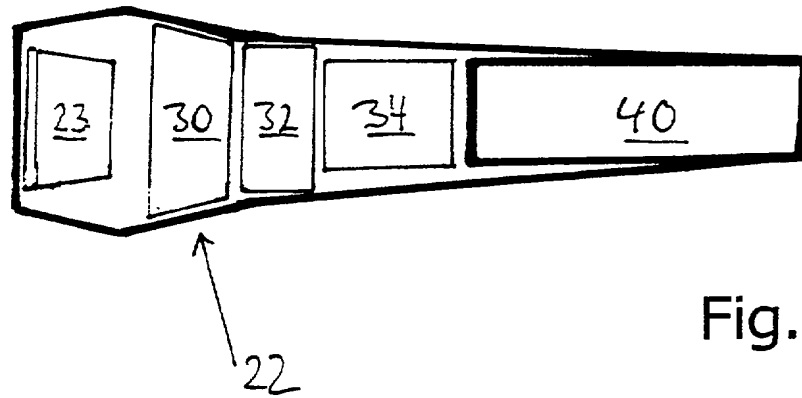


Fig. 2

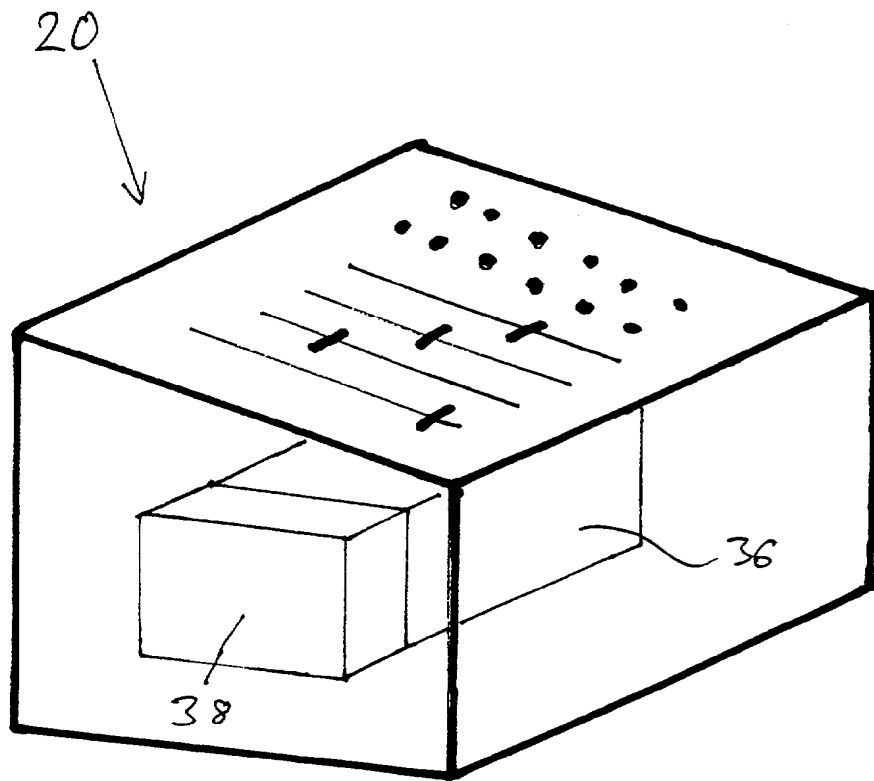


Fig. 3

**AN INSTALLATION FOR CONTROLLING AIDS FOR  
PUBLIC FUNCTIONS**

5           The invention relates to an installation for controlling aids for public functions, in particular acoustic irradiation and/or illumination systems, (e.g. public address and/or lighting systems) having a control unit to which at least one movable object, in particular an (audio) signal source, as well as one or more aids to be controlled can be connected, and comprises the control means for controlling the aids.

10           Installations of the above type are known. A known installation is constructed as a mixing console and disposed in a performance area comprising a stage area as well as a public area. The performance area has a closed construction, for instance like a congress hall, or in the open air, for instance as a stadium. The mixing console serves to control an acoustic irradiation installation which amplifies one or more audio signals  
15   from an (audio) signal source and fills the public area and also, where appropriate, the stage area with the amplified audio signal. The acoustic irradiation is performed by means of several loudspeakers of the acoustic irradiation installation which are provided in the performance area. The loudspeakers are each disposed in such a manner that they radiate the amplified audio signal in particular into a predeterminate section of the  
20   public area and/or of the stage area.

          The amplitude of the amplified audio signal can be adjusted by means of the mixing console. The mixing console is provided for operation by a sound engineer. The sound engineer performs the adjustment of the amplitude in accordance with each situation on the stage which he observes in such a manner that the overall impression in  
25   the performance area, in particular in the public area, which is produced by audio signals radiated by all the loudspeakers, is complementary to the situation in the stage

area. The amplified audio signal is supplied to each loudspeaker from the mixing console.

In addition, in the known installation a control of one or more spotlights is provided.

The spotlight is disposed in the performance area in such a manner that it can throw a  
5 narrow cone of light having a narrow included cone angle in the stage area. The  
spotlight is rotatably mounted around a vertical axis and a horizontal axis and the conic  
angle that can be radiated can be adjusted by a lighting engineer. Depending on the  
situation in the stage area, for instance the position of an actor on the stage, the  
alignment of the spotlight is performed by the lighting engineer in such a manner, for  
10 instance, that the conic angle radiated from the spotlight hits the actor.

The known installation consequently requires the attentiveness of the staff  
operating the control unit, i.e. of the sound engineer at the mixing console and of the  
lighting engineer at the spotlight, so that the control of the loudspeakers and of the  
spotlight is performed according to the situation in the stage area.

15 The object of the invention is to develop further an installation of the type  
mentioned at the beginning so that the control of the aids is rationalised.

This object is achieved in accordance with the invention with the installation of the  
type mentioned at the beginning in that a locating device for locating a relevant position,  
for instance the position of an actor is provided, which outputs a position signal  
20 indicating the relevant position to the control unit and in that the control unit controls the  
aid or aids in dependence on the position signal.

With the invention one obtains an installation by means of which the aids can be  
controlled in a particularly rational manner. The position signal outputted by the locating  
device simplifies the operation of the installation because only a small degree of  
25 attentiveness is required by the operator to adjust the control unit according to the

situation in the stage area.

So that the control unit controls the aids in dependence on the position signal, control functions determining the interaction can be preset in the device. A control operation is repeatable according to the predetermined control function. With the  
5 installation specified by the invention a higher degree of precision can be achieved in the control of the aids according to the respectively predetermined control function than with manual control.

The locating device of the installation according to the invention preferably has fixed radio beacon transmitters to be arranged spaced from one another for transmitting  
10 radio beacon signals. The fixed radio beacon signals are to be disposed in the performance area. In a further development of this embodiment, the position of the radio beacon transmitter can be input to a memory unit of the radio beacon transmitter. Moreover, the positions of the fixed radio beacon transmitters, where appropriate the spacing of the radio beacon transmitters as well as positions and other data relating to  
15 other relevant objects in the stage area and/or public area can be stored in a memory unit of the control unit. The radio beacon transmitter transmits a signal containing data on the position of the radio beacon transmitter.

The locating device has a mobile receiver for receiving the radio beacon signals and an output unit which derives the position signal from the received radio beacon  
20 signals and outputs it. The fixed radio beacon transmitters are preferably constructed as high-frequency transmitters and the mobile receiver is accordingly constructed as a high-frequency receiver.

To output the position signal to the control unit a mobile transmitter is provided, with which a receiver of the control unit is associated. The position of the mobile receiver  
25 of the radio beacon signals may preferably be determined by means of the radio beacon

signals transmitted from the radio beacon transmitters. In one embodiment this determination is performed in accordance with the so-called triangulation process or another process which is known to a person skilled in the art for locating systems. The received radio beacon signals are placed in relationship or linked with one another.

5           In a particularly preferred embodiment of the invention, the respective position of each receiver can be determined by means of several receivers, possibly independent of one another, and can be outputted to the control unit.

          In accordance with another preferred embodiment of the invention, the fixed radio beacon transmitters transmit the radio beacon signals in the GPS format and the mobile  
10       receiver is constructed as a GPS receiver. The GPS receiver is simple and cheap to produce or obtain from commercially available structural elements.

          The mobile transmitter is preferably constructed as a high-frequency transmitter and the associated receiver accordingly as a high-frequency receiver. In this embodiment the mobile transmitter can be carried in a particularly simple manner, for  
15       instance by an actor, without the freedom of movement of the actor being restricted, for instance by a connecting cable. Moreover, this embodiment does not subject the actor to the restriction of there having to be a free view between transmitter and receiver, as is required in an infrared system, for instance.

          The control unit may preferably receive derived position signals from several  
20       locating devices and process them. This embodiment of the invention is quite particularly suitable for performances in which the locating device is provided to determine several relevant positions. The mobile receivers each located at one of the relevant positions are each associated with a mobile high-frequency transmitter, which transmits the position signal in an individual carrier frequency and/or provided with an  
25       individual identification. The high-frequency receivers of the control unit are tuned to the

high-frequency transmitter, so that they can receive them on the transmitting frequency.

In this embodiment of the invention the control of the aids is possible in dependence on several relevant positions.

5 In accordance with another particularly preferred embodiment of the invention, the mobile receiver, the output unit and the mobile transmitter are constructed as a portable compact appliance. The portable compact appliance is worn, for instance, on the actor's body or in a pocket in the clothing of the actor.

The (audio) signal source of the installation specified by the invention may be constructed as a microphone. In this case the mobile receiver, the output unit and the  
10 mobile transmitter are preferably disposed in the housing of the microphone. This has the advantage that where appropriate the transmitter for transmitting the audio signal and the mobile transmitter for transmitting the position signal can be combined in one functional unit. Moreover, the energy supply can be taken from a common source, such as a battery disposed in the housing of the microphone.

15 In an alternative embodiment of the invention, a mobile transmitter is provided and fixed receiving beacons are provided to receive the signal transmitted from the mobile transmitter. The signal transmitted from the mobile transmitter is received by the fixed receiving beacons as a received signal. A position signal with an item of information relating to the position of the mobile transmitter can be determined from the large  
20 number of received signals.

Finally the invention extends to a microphone, in particular for use at a public function, with an electroacoustic transducer for receiving an audio signal in a transmitter for transmitting an audio signal, and with a locating device as specified by the invention.

25 An exemplified embodiment of the invention is explained in further detail below by means of the drawings.

Figure 1 shows as a diagrammatical model a perspective view of a



performance space in which aids are disposed, which are actuated by an installation according to the invention;

Figure 2 shows a diagrammatical representation of a longitudinal section through a microphone; and

Figure 3 shows a diagrammatical representation of a mixing console.

The performance space 2 represented in Figure 1 comprises a stage area 4 and a public area 6, which are separated from one another at a boundary surface 7. A left loudspeaker 8 and a right loudspeaker 9 are disposed in the region of the boundary surface 7 in such a manner that they fill the public area 6 in particular with sound. Furthermore, a monitor loudspeaker 10 is also provided in the region of the boundary surface 7 in such a manner that it fills the stage area 4 in particular with sound.

Moreover, disposed in the public area 6 is a spotlight 12, which throws a cone of light in a narrow cone angle 13 and in particular beams into the stage area 4. The spotlight 12 is movably constructed around a vertical axis 14 and a horizontal axis 15. Drives (not represented), which achieve remote-controlled adjustability by turning the spotlight 12 around the axes 14 and 15, are provided on the spotlight 12. Further operable aids, such as, for example, mobile stage parts and/or special effects devices, can be disposed in the performance area.

A control unit constructed as a mixing console 20 is disposed in the public area 6 in a region lying opposite the boundary surface 7. The mixing console 20 is connected to an amplifying facility (not represented), which serves to amplify audio signals. The mixing console 20 comprises regulators to regulate the amplitude of amplified audio signals. The left loudspeaker 8, the right loudspeaker 9 and the monitor loudspeaker 10 are connected to the mixing console 20. Amplified and regulated audio signals can be output from the mixing console 20 to the loudspeakers 8, 9, 10.

A mobile microphone 22 is disposed in the stage area 4. The microphone is detachably fixed to a stand 24 and can be released from the stand 24 by a person in the stage area 4, for instance an actor, and be carried through the stage area 4. In this case the freedom of movement of the actor carrying the microphone 22 is not restricted by a connecting cable to the amplifying facility; the microphone 22 is in fact equipped with a high-frequency transmitter 34 which transmits a high frequency radio signal modulated by an audio signal provided by an electro-acoustic transducer 23. The radio signal is received by a high-frequency receiver at the amplifying facility.

10       Disposed in the performance area 2 are four radio beacon transmitters 26, 26', 28, 28' in such a manner that they are spaced in pairs approximately at the maximum distance apart. Additional radio beacon transmitters can be disposed in the performance area 2 in order to increase the efficiency of the locating device. The arrangement of the radio beacon transmitters 26, 26', 28, 28' is fixed at least for the period of a performance. Two radio beacon transmitters 26, 26' are disposed in the stage area 4 opposite the boundary surface 7; two further radio beacon transmitters 28, 28' are disposed in the public area 6 opposite the boundary surface 7. The radio beacon transmitters are connected to the mixing console 20 in order to coordinate the transmitted signals centrally in a suitable manner. The position of the radio beacon transmitters 26, 26', 28, 28' is stored in a memory device of the mixing console 20. The radio beacon transmitters 26, 26', 28, 28' transmit a high-frequency signal in the GPS format, which amongst other things contains data regarding the position of the respective radio beacon transmitter 26, 26', 28, 28'.

The microphone 22 represented in Figure 2 includes the electroacoustic transducer 23. Disposed in the housing of the microphone 22 is a GPS receiver 30, which is provided to receive the signals transmitted from the radio beacon transmitters 26, 26', 28, 28'. An output unit 32 for determining and outputting a position signal

derived from the radio beacon signals is also disposed in the housing of the microphone 22. An accumulator for energy supply can be inserted in a battery compartment 40. The output unit 32 delivers the position signal to the high-frequency transmitter 34 of the microphone 22 which transmits the position signal. The transmitted position signal is  
5 received by the high-frequency receiver of the amplifying facility (not represented) and is transmitted to the mixing console 20.

A data processing system 36 with a memory unit 38 is disposed in the mixing console 20 represented in Figure 3. The data processing system 36 determines from the position signal - preferably for three dimensions - the positional data of the GPS  
10 receiver 30 of the microphone 22. The data processing system 36 performs a control function program stored in the memory unit 38. By using the positional data as parameters, the control function program 36 outputs a first group of control values, which serve to regulate the amplitude of the amplified audio signals delivered by the loudspeakers 8, 9, 10. In accordance with a determined control function program, the  
15 amplitude of the audio signal outputted from the left loudspeaker 8 is regulated to be larger than the amplitude of the audio signal outputted from the right loudspeaker 9 when the GPS receiver 30 of the microphone 22 is closer to the left loudspeaker 8 than to the right loudspeaker 9. The amplitude of the audio signal delivered by the monitor  
20 loudspeaker 10 is regulated to be louder if the GPS receiver 30 is removed from the monitor loudspeaker 10. The position of the GPS receiver 30 corresponds to that of the microphone 22 and, for instance, also to the position of the actor because the GPS receiver 30 is disposed in the housing of the microphone 22.

Moreover, the control function program outputs a second group of control values, which serve to actuate the drives (not represented) for the rotation of the spotlight 12  
25 around the vertical and the horizontal axes 14 and 15 respectively. The spotlight 12 is

aligned in accordance with a determined control function program so that the centre axis of the dihedral angle 13 of the cone of light intersects the position of the GPS receiver 30 in the housing of the microphone 22 and the actor is illuminated in the cone of light of the spotlight 12.

**Claims**

1. An installation for controlling aids for public functions, comprising a control unit to which at least one mobile object, as well as one or more aids to be controlled can be connected, and a locating device to locate a relevant position, which outputs a position signal indicating the relevant position to the control unit, the control unit being arranged to control the aid or aids in dependence on the position signal.

2. An installation according to Claim 1, wherein the locating device comprises fixed radio beacon transmitters, to be disposed spaced from one another, for transmitting radio beacon signals, a mobile receiver for receiving the radio beacon signals and an output unit, which derives the position signal from the received radio beacon signals outputs it.

3. An installation according to Claim 2, wherein a mobile transmitter, with which a receiver of the control unit is associated, is provided to output the position signal to the control unit.

4. An installation according to Claim 3, wherein the fixed radio beacon transmitters are constructed as high-frequency transmitters and the mobile receiver is accordingly constructed as a high-frequency receiver.

5. An installation according to Claim 3 or 4, wherein the fixed radio beacon transmitters transmit the radio beacon signals in the GPS format and the mobile receiver is constructed as a GPS receiver.

6. An installation according to one of Claims 3 to 5, wherein the mobile transmitter is constructed as a high-frequency transmitter and the associated receiver is accordingly constructed as a high-frequency receiver.

5 7. An installation according to one of the preceding Claims, wherein the control unit can receive derived position signals from several locating devices and process them.

8. An installation according to one of the preceding Claims, wherein  
10 the mobile receiver, the evaluation unit and the mobile transmitter are constructed as a portable compact appliance.

9. An installation according to one of the preceding Claims, wherein  
the (audio) signal source is constructed as a microphone.

15 10. A control unit according to Claim 9, wherein the mobile receiver, the evaluation unit and the mobile transmitter are disposed in the housing of the microphone.

20 11. A microphone (22), specifically for use at a public function, comprising  
an electroacoustic transducer for receiving an audio signal and a transmitter for transmitting an audio signal,  
a mobile receiver (30) for receiving radio beacon signals, an output unit  
25 (32) for deriving and outputting a signal from the received radio beacon signals

and a transmitter (34) for outputting the derived signal to a control unit for controlling aids.



INVESTOR IN PEOPLE

Application No: GB 0026940.7  
Claims searched: 1-10

Examiner: Martyn Dixon  
Date of search: 1 May 2001

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.S): H4R (RSAD,RSX); H4D (DPDA,DPDD,DPDN,  
DPDX,DPBC,DPBX,DAB); G3N (NGE3B); A6M (MFC,MFX)  
Int Cl (Ed.7): A63J; H04R; H04S; H05B; G01S  
Other: Online: EPODOC, WPI, JAPIO

### Documents considered to be relevant:

| Category | Identity of document and relevant passage   | Relevant to claims |
|----------|---|--------------------|
| X        | WO95/14241 A (Wybron) see especially figs 1 and 2 and page 11, lines 7-10                 | 1-4,6-8            |
| X        | EP 0591899 A (Ushio U-Tech) see the whole document  | 1,7,8              |
| X        | US 4067015 A (USA) see especially col 2, line 63 to col 3, line 26 and col 4, lines 28-33 | 1,7,8              |
| X        | FR 002747003 A (Pompier Denis) see abstract   | 1                  |
| X        | JP 100092203 A (Matsushita) see abstract  | 1                  |
| X        | JP 070030961 A (Nippondenso) see abstract   | 1-4,6-8            |

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